What is claimed is:

1. A method of manufacturing a ceramic film, comprising:

crystallizing a raw material including a complex oxide by subjecting the raw material to a heat treatment in an atmosphere pressurized to two atmospheres or more and containing oxygen at a volume ratio of 10% or less.

2. A method of manufacturing a ceramic film, comprising:

crystallizing a raw material including a complex oxide by subjecting the raw material to a heat treatment in a state pressurized to two atmospheres or more using a rapid thermal annealing method.

3. The method of manufacturing a ceramic film as defined in claim 2,

wherein the heat treatment is performed in an atmosphere containing oxygen at a volume ratio of 10% or less.

4. The method of manufacturing a ceramic film as defined in claim 1 or 2,

wherein the heat treatment includes pressurizing to two atmospheres or more at least before raising a temperature.

5. The method of manufacturing a ceramic film as defined in claim 1 or 2,

wherein the complex oxide includes Pb in constituent elements, and

wherein the heat treatment includes raising a temperature after pressurizing to two atmospheres or more at 100°C or less in a temperature raising process.

6. The method of manufacturing a ceramic film as defined in claim 1 or 2,

wherein a temperature raising process of the heat treatment is performed in a

pressurized state with respect to atmospheric pressure, and a temperature lowering process of the heat treatment is performed at a reduced pressure with respect to the pressurized state.

7. The method of manufacturing a ceramic film as defined in claim 1 or 2,

wherein the raw material is a mixture of a sol-gel raw material and an MOD raw material, the sol-gel raw material including at least one of a hydrolysate and a polycondensate of the complex oxide, and the MOD raw material including constituent elements of the complex oxide in an organic solvent.

8. The method of manufacturing a ceramic film as defined in claim 1 or 2,

wherein the raw material includes the complex oxide and a paraelectric material having a catalytic effect on the complex oxide.

9. The method of manufacturing a ceramic film as defined in claim 8,

wherein the paraelectric material includes an oxide which includes Si or Ge in constituent elements or an oxide which includes Si and Ge in constituent elements.

10. A ceramic film manufactured by the method of manufacturing a ceramic film as defined in any one of claims 1 to 9.

11. A semiconductor device comprising the ceramic film as defined in claim 10 as a gate insulating film.

12. A method of manufacturing of a ferroelectric capacitor, comprising:

forming a lower electrode over a substrate;

heating a raw material including a complex oxide in an atmosphere pressurized

to two atmospheres or more and containing oxygen at a volume ratio of 10% or less at a temperature raising rate of 100°C/min or less, thereby forming a lower alloy film of a compound of a first metal and a second metal over the lower electrode, the first metal making up the complex oxide and the second metal making up the lower electrode; and forming a ceramic film, in which the raw material is crystallized, over the lower alloy film; and

forming an upper electrode over the ceramic film.

13. The method of manufacturing a ferroelectric capacitor as defined in claim 12,

wherein the heat treatment includes pressurizing to two atmospheres or more at least before raising a temperature.

14. The method of manufacturing a ferroelectric capacitor as defined in claim 12,

wherein the complex oxide includes Pb in constituent elements, and

wherein the heat treatment includes raising a temperature after pressurizing to two atmospheres or more at 100°C or less in a temperature raising process.

15. The method of manufacturing a ferroelectric capacitor as defined in claim 12,

wherein a temperature raising process of the heat treatment is performed in a pressurized state with respect to atmospheric pressure, and a temperature lowering process of the heat treatment is performed at a reduced pressure with respect to the pressurized state.

16. The method of manufacturing a ferroelectric capacitor as defined in claim 12,

comprising:

forming an oxide film of a third metal which makes up the upper electrode over the ceramic film before forming the upper electrode over the ceramic film, and subjecting the oxide film to a heat treatment in a state pressurized to two atmospheres or more, thereby forming an upper alloy film of a compound of the first metal and the third metal,

wherein the upper electrode is formed over the upper alloy film.

17. A method of manufacturing a ferroelectric capacitor, comprising:

forming a lower electrode over a substrate;

forming an oxide film of a first metal which makes up a complex oxide over the lower electrode;

subjecting the oxide film to a first heat treatment in a state pressurized to two atmospheres or more, thereby forming a lower alloy film of a compound of the first metal and a second metal which makes up the lower electrode;

subjecting a raw material including the complex oxide to a second heat treatment in a state pressurized to two atmospheres or more by using a rapid thermal annealing method, thereby forming a ceramic film in which the raw material is crystallized over the lower alloy film; and

forming an upper electrode over the ceramic film.

18. The method of manufacturing a ferroelectric capacitor as defined in claim 17,

wherein the second heat treatment is performed in an atmosphere containing oxygen at a volume ratio of 10% or less.

19. The method of manufacturing a ferroelectric capacitor as defined in claim

17,

wherein the heat treatment includes pressurizing to two atmospheres or more at least before raising a temperature.

20. The method of manufacturing a ferroelectric capacitor as defined in claim 17,

wherein the complex oxide includes Pb in constituent elements, and

wherein the heat treatment includes raising a temperature after pressurizing to two atmospheres or more at 100°C or less in a temperature raising process.

21. The method of manufacturing a ferroelectric capacitor as defined in claim 17,

wherein a temperature raising process of the second heat treatment is performed in a pressurized state with respect to atmospheric pressure, and a temperature lowering process of the second heat treatment is performed at a reduced pressure with respect to the pressurized state.

22. The method of manufacturing a ferroelectric capacitor as defined in claim 17, comprising:

forming an oxide film of a third metal which makes up the upper electrode over the ceramic film before forming the upper electrode over the ceramic film, and subjecting the oxide film to a third heat treatment in a state pressurized to two atmospheres or more, thereby forming an upper alloy film of a compound of the first metal and the third metal,

wherein the upper electrode is formed over the upper alloy film.

23. The method of manufacturing a ferroelectric capacitor as defined in claim 12

or 17,

wherein the raw material is a mixture of a sol-gel raw material and an MOD raw material, the sol-gel raw material including at least one of a hydrolysate and a polycondensate of the complex oxide, and the MOD raw material including constituent elements of the complex oxide in an organic solvent.

24. The method of manufacturing a ferroelectric capacitor as defined in claim 12 or 17,

wherein the raw material includes the complex oxide and a paraelectric material having a catalytic effect on the complex oxide.

25. The method of manufacturing a ferroelectric capacitor as defined in claim 24,

wherein the paraelectric material includes an oxide which includes Si or Ge in constituent elements or an oxide which includes Si and Ge in constituent elements.

26. A method of manufacturing a ferroelectric capacitor, comprising:

forming at least a lower electrode, a ceramic film, and an upper electrode over a substrate; and

performing a heat treatment for recovering ferroelectric characteristics in a state pressurized to two atmospheres or more after forming at least the upper electrode.

27. A method of manufacturing a ferroelectric capacitor, comprising:

forming at least a lower electrode, a ceramic film, and an upper electrode over a substrate; and

performing a heat treatment for recovering ferroelectric characteristics in a state pressurized to two atmospheres or more after etching at least the ceramic film into a

given shape.

28. The method of manufacturing a ferroelectric capacitor as defined in claim 26 or 27,

wherein the heat treatment for recovering the ferroelectric characteristics is performed by using a rapid thermal annealing method.

29. A ferroelectric capacitor manufactured by the manufacturing method of a ferroelectric capacitor as defined in any one claims 12 to 28.

30. A semiconductor device comprising the ferroelectric capacitor as defined in claim 29.